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APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
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09/932,253

08/16/2001

Chi Wu

LIGHT1900-1
(LIGHT2260)

3916

7590

04/23/2003

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EXAMINER

CULBERT, ROBERTS P

ART UNIT

PAPER NUMBER

1763

DATE MAILED: 04/23/2003

Please find below and/or attached an Office communication concerning this application or proceeding.

Office Action Summary

Application No.

09/932,253

Applicant(s)

WU ET AL.

Examiner

Roberts Culbert

Art Unit

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-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

- 1) ☐ Responsive to communication(s) filed on 10 February 2003.
- 2a) ☒ This action is **FINAL**. 2b) ☐ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

- 4) ☒ Claim(s) 27-29, 34-38 and 73-95 is/are pending in the application.
- 4a) Of the above claim(s) _____ is/are withdrawn from consideration.
- 5) ☐ Claim(s) _____ is/are allowed.
- 6) ☒ Claim(s) 27-29, 34-38 and 73-95 is/are rejected.
- 7) ☐ Claim(s) _____ is/are objected to.
- 8) ☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☐ The drawing(s) filed on _____ is/are: a) ☐ accepted or b) ☐ objected to by the Examiner.
- Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on _____ is: a) ☐ approved b) ☐ disapproved by the Examiner.
- If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).
- a) ☐ All b) ☐ Some * c) ☐ None of:
1. ☐ Certified copies of the priority documents have been received.
2. ☐ Certified copies of the priority documents have been received in Application No. _____.
3. ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).
- * See the attached detailed Office action for a list of the certified copies not received.
- 14) ☐ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. § 119(e) (to a provisional application).
- a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☒ Acknowledgment is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892) 4) ☐ Interview Summary (PTO-413) Paper No(s). _____
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948) 5) ☐ Notice of Informal Patent Application (PTO-152)
- 3) ☒ Information Disclosure Statement(s) (PTO-1449) Paper No(s) 4 & 6. 6) ☐ Other: _____

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DETAILED ACTION

Response to Arguments

Applicant's arguments filed 2/10/03 have been fully considered but they are not persuasive.

In response to applicant's argument that there is no suggestion to combine the references, the examiner recognizes that obviousness can only be established by combining or modifying the teachings of the prior art to produce the claimed invention where there is some teaching, suggestion, or motivation to do so found either in the references themselves or in the knowledge generally available to one of ordinary skill in the art. See *In re Fine*, 837 F.2d 1071, 5 USPQ2d 1596 (Fed. Cir. 1988) and *In re Jones*, 958 F.2d 347, 21 USPQ2d 1941 (Fed. Cir. 1992).

In this case, applicant has argued that the Handa abstract indicates that the patent is directed to integrated optical devices, whereas the Wong and DeOmellas references are directed to etching of integrated circuits (ICs). The applicant concludes that because Wong does not teach that the etching method is suitable for use with optical components, there is no suggestion to combine the references.

The argument is not persuasive because the both the Wong and DeOmellas references teach the etching of silicon, a common material for optical device fabrication. Further, it is notoriously old and well known in the semiconductor fabrication art, that integrated circuits frequently are comprised of optical devices and related components. Evidence of this is provided in U.S. Patent 4,927,781 to Miller and U.S. Patent 4,956,682 to Ohnaka et al. No evidence is provided by applicant to support the assumption that the references exclude optical components by referring to integrated circuits.

Applicant has argued that there is no reasonable expectation of success because the Wong patent is directed to integrated circuit fabrication that produces smoothness several orders of magnitude less than is produced in waveguide formation.

The argument is not persuasive because no evidence is provided by applicant to show the difference in smoothness. No reference to smoothness is made in the Wong or DeOmellas references. Hence, they do not teach away from the formation of optical components. Furthermore, as stated above, the term integrated circuit does not teach away from the formation of optical components, instead the

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term is inclusive of these devices as shown by the cited references to Miller and Ohnaka.

Applicant has argued that the uniformity requirements for wave-guide formation are more stringent than the uniformity requirements for integrated circuit fabrication. The applicant concludes that there is therefore a negative expectation of success associated with using IC etches to fabricate waveguides. The argument is not persuasive because there is no indication in the references that the uniformity characteristics desired for waveguide fabrication are not met by the etching methods described.

Applicant has argued that smoothness and uniformity requirements associated with waveguide fabrication become more difficult as wafer size increases. The applicant concludes that this fact enhances the negative expectation of success associated with using integrated circuit etches to fabricate waveguides.

The argument is not persuasive because there is no evidence that the etching methods described in the references do not meet the stringent requirements for waveguide fabrication. Further, one of ordinary skill in the art would recognize that integrated circuit etching often exceeds the required uniformity and smoothness in order to improve other features of the etch such as profile control.

Claim Rejections - 35 USC § 103

The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

Claims 27-29, 34, 35, 37, 38, 91, and 93 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,652,290 to Cho in view of U.S. Patent 6,127,277 to DeOrnellas.

Cho teaches a method for forming an optical component by obtaining a wafer having a light-transmitting medium (See Fig. 1) positioned over a base (Column 2, Lines 32-33). An etching medium is

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applied to the wafer to form surfaces of the component (Column 2 Lines 63-64) including the sides of a ridge that define a waveguide(See Figure 2). Cho teaches the formation of a waveguide using a photoresist mask (Col. 2, Lines 60-65).

Cho does not show the etching medium being applied in an etching chamber configured to etch wafers having at least one dimension with a length greater than 6 inches.

Referring to Figure 6, DeOrnellas shows a continuous etching chamber (38) configured to etch wafers having at least one dimension with a length from 6-8 inches (Column 6, Lines 2-7). DeOrnellas teaches that the chamber is a suitable apparatus for the purpose of etching vertical sidewalls in a silicon semiconductor wafer (Column 2, Lines 33-40). It would have been obvious to one of ordinary skill in the art to use the chamber of DeOrnellas because it was known in the art at the time of invention to be a suitable apparatus for etching vertical features in a wafer. It may be assumed that the etching medium is applied continuously since the reference does not specify otherwise.

Regarding the limitation of etchant uniformity, the limitation is not given any patentable weight because there is no evidence of the criticality of the claimed range.

Claim 36 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S Patent 4,652,290 to Cho in view of U.S. Patent 6,127,277 to DeOrnellas, and U.S. Patent 6,324,204 to Deacon. As applied above, Cho and DeOrnellas describe the invention substantially as claimed, but do not show silicon for the light-transmitting medium. Deacon teaches that silicon is a common material for the manufacture of waveguides (Column 8, Line 59-Column 9, Line 9). It would have been obvious to one of ordinary skill at the time of invention to use silicon for the formation of the waveguide layer because silicon was known at the time to be a suitable material for the manufacture of a waveguide layer.

Claims 73-78 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S Patent 4,652,290 to Cho in view of U.S. Patent 6,127,277 to DeOrnellas, and U.S. Patent 6,303,513 to Kahn.

Kahn teaches a fluorinated etching chemistry including SF_6 , HBr , O_2 , and SiF_4 to increase hardmask selectivity. See Paragraph 7.). It would have been obvious to one of ordinary skill in the art at

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the time of invention to use the etching medium of Kahn in order to increase etch rate and enhance mask selectivity as suggested by Kahn.

Claims 79-90 and 95 are rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,652,290 to Cho in view of U.S. Patent 6,127,277 to DeOrnellas, U.S. Patent Publication 2001/0001652 to Kanno, U.S. Patent 5,874,362 to Wong, and U.S. Patent 6,235,214 to Deshmukh

Wong does teach the use of fluorinated gas mixtures for etching silicon. Wong shows an etching mixture containing hydrogen bromide, silicon tetrafluoride, helium (a noble gas), and oxygen (Column 7, Lines 21-23). Wong also suggests the use of an etching medium including sulfur hexafluoride, and nitrogen trifluoride as etching gasses (Column 7, Lines 61-63). Wong also teaches a pressure of 5-200 mTorr. It would have been obvious to one of ordinary skill in the art at the time of invention to use the etching medium and conditions suggested by Wong in order to obtain good profile control.

Deshmukh shows an etching gas mixture containing sulfur hexafluoride, oxygen and trifluoromethane (Column 2, Lines 33-35). Deshmukh also states that other gasses containing at least F, H and C elements may also be used to provide added flexibility in profile and dimension control. (Col. 6, Lines 35-38) It would have been obvious to one of ordinary skill in the art at the time of invention to use the etching medium of Deshmukh in order to increase etch rate and enhance mask selectivity and profile control as suggested by Deshmukh.

Kanno teaches that C_4H_8 , CHF_3 and SF_6 are suitable etchants for the purpose of etching a semiconductor (Paragraph 57). It would have been obvious to one of ordinary skill in the art at the time of invention to use the etching medium of Kanno in order to improve the etch profile and enhance mask selectivity.

Claim 94 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,652,290 to Cho in view of U.S. Patent 6,127,277 to DeOrnellas, and U.S. Patent 5,811,022 to Savas.

Cho in view of DeOrnellas teaches the method of the invention substantially as claimed, but do not show the use of an inductively coupled plasma etch. Savas teaches that inductively coupled plasma etching is suitable for processing semiconductor wafers. It would have been obvious to one of ordinary

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skill in the art at the time of invention to use the reactor shown by Savas in order to benefit from the advantages of inductively coupled plasma recited by Savas (Col. 4, Line 66- Col. 5, line 7).

Claim 92 is rejected under 35 U.S.C. 103(a) as being unpatentable over U.S. Patent 4,652,290 to Cho et al. in view of U.S. Patent 6,127,277 to DeOrnellas et al., and U.S. Patent 5,874,362 to Wong.

Cho uses a photoresist mask to form the waveguide.

Wong teaches that an oxide mask is suitable for the purpose of forming a mask (Column 5, Lines 52-55). It would have been obvious to one of ordinary skill in the art to use an oxide mask because it was known in the art at the time of invention to be a suitable method for forming a mask.

Double Patenting

The nonstatutory double patenting rejection is based on a judicially created doctrine grounded in public policy (a policy reflected in the statute) so as to prevent the unjustified or improper timewise extension of the "right to exclude" granted by a patent and to prevent possible harassment by multiple assignees. See *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985); *In re Van Ornum*, 686 F.2d 937, 214 USPQ 761 (CCPA 1982); *In re Vogel*, 422 F.2d 438, 164 USPQ 619 (CCPA 1970); and, *In re Thorington*, 418 F.2d 528, 163 USPQ 644 (CCPA 1969).

A timely filed terminal disclaimer in compliance with 37 CFR 1.321(c) may be used to overcome an actual or provisional rejection based on a nonstatutory double patenting ground provided the conflicting application or patent is shown to be commonly owned with this application. See 37 CFR 1.130(b).

Effective January 1, 1994, a registered attorney or agent of record may sign a terminal disclaimer. A terminal disclaimer signed by the assignee must fully comply with 37 CFR 3.73(b).

Claims 27-29, 34-38, and 73-95 are provisionally rejected under the judicially created doctrine of obviousness-type double patenting as being unpatentable over claims 1-34 of copending Application No. 09/845,093 in view of U.S. Patent 6,127,277 to DeOrnellas and U.S. Patent 6,324,204 to Deacon.

Although the conflicting claims are not identical, they are not patentably distinct from each other because the examined claims would have been obvious over the reference claims in view of the prior art as applied above. See, e.g., *In re Berg*, 140 F.3d 1428, 46 USPQ2d 1226 (Fed. Cir. 1998); *In re Goodman*, 11 F.3d 1046, 29 USPQ2d 2010 (Fed. Cir. 1993); *In re Longi*, 759 F.2d 887, 225 USPQ 645 (Fed. Cir. 1985);

This is a provisional obviousness-type double patenting rejection because the conflicting claims have not in fact been patented.

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Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

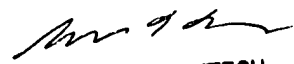
A shortened statutory period for reply to this final action is set to expire **THREE MONTHS** from the mailing date of this action. In the event a first reply is filed within **TWO MONTHS** of the mailing date of this final action and the advisory action is not mailed until after the end of the **THREE-MONTH** shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than **SIX MONTHS** from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to Roberts Culbert whose telephone number is (703) 305-7965. The examiner can normally be reached on Monday-Friday (7:30-4:00).

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Gregory Mills can be reached on (703) 308-1633. The fax phone numbers for the organization where this application or proceeding is assigned are (703) 872-9310 for regular communications and (703) 872-9311 for After Final communications.

Any inquiry of a general nature or relating to the status of this application or proceeding should be directed to the receptionist whose telephone number is (703) 308-0661.

April 17, 2003


BENJAMIN L. UTECH
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